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ABSTRACT

The introductory instructional technology course at Purdue University represents a practical application of modular instruction, stated performance objectives, a multi-media approach to learning and mastery evaluation. The instructional modules are designed from a list of objectives and student projects. Students progress at their own rate toward mastery and are provided with a variety of learning activities and evaluation techniques. Instructional formats include large-group presentations and demonstrations, small-group discussions, guest subject-matter specialists, resource people, games and simulations along with individual study. A key element in the student-centered approach is success orientation--when students do not achieve, the course has failed. A mastery approach to evaluation is employed. The student selects from a variety of evaluation techniques, such as written quizzes, oral examinations, demonstrations and projects. He may re-test on any module he has failed to master. As a consequence of using objectives, a variety of learning strategies, as well as self-pacing and diagnostic evaluation, over 75% of the students demonstrate mastery of 90% of the course content. (WCH)

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A MODULAR APPROACH FOR DEVELOPING
COMPETENCIES IN INSTRUCTIONAL TECHNOLOGY*

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Even though educators have long recognized and acknowledged individual differences in students, each member of a class is often locked into the same instructional sequence with identical learning materials. All students are expected to learn the same content in the same amount of time. One possible solution to this problem is modular instruction incorporating specific objectives, a variety of learning strategies and mastery evaluation. A module is an instructional package dealing with a single conceptual unit of subject matter. With modules it is possible to individualize learning by enabling each student to select and master one unit of content before moving to another. The modules can be used individually or combined in a multiplicity of different sequences.

The authors of this paper are currently applying a modular approach to the structure of an instructional technology course at Purdue University. The students in the course are predominately pre-service and in-service teachers. Approximately twenty five percent of the students are not teachers and are therefore seeking different types of learning experiences from the course. In order to meet the needs of all the students, who number approximately one hundred per semester, the course provides a variety of learning activities which are student-centered and incorporate a multi-media approach. The learning sequence for each student is constructed from a "bank" of forty modules.

Modular Instruction

The forty modules currently being used in the course are listed on the Module Selection Sheet shown on page 2. Each module requires about three to five hours of student time to complete. Approximately ten modules constitute one credit hour. At present the course is available for one, two or three credit hours.

There are three columns on the Module Selection Sheet -- each equivalent to one credit hour of study. The left-hand column is the basic core of the course and is required of all students. So a student taking the course for

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MODULE SELECTION SHEET

Name _____

Required

Optional*

Multi-Media Lesson

- | | | | | | |
|------------------------|-------|----------------------------|-------|--------------------------------------|-------|
| 1. Systems Approach | _____ | 4. Graphs & Charts | _____ | 21. Modular Instr. | _____ |
| 2. Selection/Utiliz | _____ | 6. Still Pictures | _____ | 22. Fundamentals ($\frac{1}{2}$) | _____ |
| 3. Visual Communica | _____ | 7. Films | _____ | 23. Selection of ($\frac{1}{2}$) | _____ |
| 5. Trans/Overhead | _____ | 9. Television | _____ | 24. Designing Modules | _____ |
| 8. Audio Materials | _____ | 10. Photography | _____ | 25. Objectives | _____ |
| 11. Real Things/Models | _____ | 12. Community Resources | _____ | 26. Criterion Items | _____ |
| 14. Supplementary | _____ | 13. Games/Simulation | _____ | 27. Learner Character. | _____ |
| 16. Trends in Media | _____ | 15. Printed Materials | _____ | 28. Sequencing | _____ |
| 17. A-V Equipment | _____ | 18. Programmed Instr. | _____ | 29. Student Tryout | _____ |
| 40. Mastery | _____ | 19. Audio-Tutorial Instr. | _____ | 30. Evaluation/Revise | _____ |
| | _____ | 20. Computer-Assisted Ins. | _____ | 31. Utilization of ($\frac{1}{2}$) | _____ |
| | _____ | 33. Intellectual Dev. | _____ | 32. Implementing ($\frac{1}{2}$) | _____ |
| TOTAL | _____ | | | | |

TOTAL

Projects

- Audio Tape (5 max.) _____
Picture Mounting () _____
Transparencies () _____

35. Creativity _____
36. Interpersonal Trans. _____
37. Assessing T. C. _____
38. Maps & Globes _____
39. Instr. Matrls. Cntr. _____

TOTAL.

suggest you do ten

TOTAL

1. Objectives _____
2. Criterion Items _____
3. Target Population _____
4. Use of Media _____
5. Student Involvement _____
6. Use of Questions _____
7. Cover Objectives _____
8. Bibliography _____
9. Student Tryout _____
10. Revisions _____

Multi-Media Required

Optional

Projects

TOTAL

TOTAL

1 hr. 2 hr. 3 hr.

A	125+	250+	375+
1	1	1	1
2	1	1	1
3	1	1	1
4	1	1	1
5	1	1	1
6	1	1	1
7	1	1	1
8	1	1	1
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10	1	1	1
11	1	1	1
12	1	1	1
13	1	1	1
14	1	1	1
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99	1	1	1
100	1	1	1

B	110+	225+	335+
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6	1	1	1
7	1	1	1
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94	1	1	1
95	1	1	1
96	1	1	1
97	1	1	1
98	1	1	1
99	1	1	1
100	1	1	1

C	100+	200+	300+
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Inc. 99- 199- 299-

one credit hour would complete the ten modules listed in the first column and associated projects of his own choosing to accumulate points and reach a desired grade level. Each module contains a list of possible projects from which the student may select, or the student after consulting with the instructor may design his own projects to be completed.

A student taking the course for two credits completes the first column, as well as either the middle or right-hand column. The middle column provides a broader study of basic media. There are eighteen modules listed from which the student completes approximately ten, and he does additional projects relating to the topics which appeal to him.

If the student desires to learn about the systematic design and development of instructional materials, he can complete the requirements in the right-hand column. The modules in this column deal with the design, development, selection, utilization and evaluation of instructional materials. As part of this portion of the course the student completes a major project -- namely, the design of a multi-media lesson which is developed and tested using students in actual classrooms. In addition to applying a systematic approach to the design of instructional materials, the student must utilize many of the principles discussed in the course and must design or select those specific media and materials which will allow the users to meet the stated objectives.

A student taking the course for three credit hours completes the requirements in all three columns. The columns are designed to provide approximately 125 points each. However, extra credit can be gained in any column. The course is analogous to a total college curriculum. Some of the modules are considered basic and required of all students. Others are in a group from which the student may elect those which meet his individual needs and interests. Still other modules are optional. The approach allows for much greater student freedom and flexibility - particularly for those students who are taking the total course as an elective or for enrichment.

Objectives and Projects

Each module is based upon a list of detailed objectives and student projects. A sample of the objectives and possible projects for a module on audio materials is shown on page 4. If a student wishes to learn different or additional materials he may write his own objectives. This practice is encouraged since it promotes increased student involvement in an already student-centered approach.

Readings

Chapter 2 and Pages 464-477 in AV Instruction

Objectives

1. Describe five techniques for improving the listening skills of your students. Each description should include about 20 words.
2. List five specific sources of ready-made audio materials.
3. Synthesize in about 100 words each five different uses of audio materials in learning. Your description should be specific as to subject matter, purposes/objectives, and equipment/materials needed.
4. Describe in about 100 words five research findings about listening.
5. Discuss a procedure (process) for using pre-recorded audio materials:
a) in group instruction and b) in individual (self) instruction
6. Describe three ways of evaluating with audio tapes.
7. Describe three "new" tele-media and include a description of how you could use each of them in your own teaching.
8. Discuss five techniques which should be used when preparing an audio tape for instructional purposes.
9. Describe the three audio media most often used in schools.
10. List four advantages and four disadvantages of each of the following:
a) disc recordings, b) open reel tape recordings, and c) cassette tapes.
11. Compare costs for the three audio media and the cost of open reel and cassette blank tapes in relation to recording time.
12. Select the best audio medium for a given situation and justify the selection of that medium, stating the advantages and/or disadvantages that apply.

Possible Projects

(8-A is a required project)

- 8-A Prepare an audio tape. It will be evaluated using the criteria in the 5 pts. handout "Improving your Taping Talent". Include a description of how the tape will be used along with its objective(s).
- 8-B Obtain a commercially prepared audio tape and evaluate it using a given 5 pts. set of criteria, such as "Improve Your Taping Talent", or using your own criteria.
- 8-C Synthesize a set of criteria for evaluating audio materials.
5 pts

The student chooses the projects he wishes to complete. The relative point value of each is based upon the amount of time which should be required to satisfactorily complete the project. Except for the three required projects in the left-hand column (page 2), interest and/or desire to gain points motivates students to complete other projects. Students are encouraged to devise their own projects which is the origin of a majority of those currently being used.

The objectives contained in the modules are mostly from the lower levels of Bloom's taxonomy, namely knowledge, comprehension and application. If the taxonomy is, in fact, a hierarchy as Bloom maintains, then these lower level skills are prerequisite to the higher level activities. The projects and other activities require the higher level skills, i.e., analysis, synthesis and evaluation. A reading assignment and/or class presentation are provided for each set of objectives. The students may gain mastery of the objectives by reading the text, coming to class discussions, or working with fellow students. Most students choose a combination of activities as described in the next section.

Learning Strategies

Since the course is taken primarily by teachers and media specialists, the instructors attempt to use all of the media which are discussed. They try to practice what they preach! They are not limited to one format, instead a wide variety of instructional formats is used. Here is just a partial listing of the activities used in the course:

Large group presentations and demonstrations	Small group discussions and problem solving tasks
Guest subject-matter specialists	Resource people (outside class)
Games and simulations	Field trips
Individual study	Reading textbooks
Self-instructional materials	Panel discussions
Audio tapes	Video tapes
Computer-Assisted Instruction	Slide/Tape presentations
Programmed Instruction	Real Things and Their Models
Free & Inexpensive Supplementary Materials	Individualized Projects and Demonstrations
Peer Tutoring	Teacher Tutoring

The importance and use of media are demonstrated by providing a multi-media approach in the instruction within the course.

Mastery Evaluation

The evaluation phase of the course may be the most important aspect of the course. A mastery evaluation strategy is used, hence the student is working toward a pre-established criterion (see lower-right hand corner of Module Selection Sheet on page 2), and not competing with his classmates. The objectives and levels of achievement are spelled out in advance. Therefore, the student knows exactly what is expected of him. Any student can test over any of the material at anytime. Both written and oral examinations are given over the objectives. The student can select the type of test he wishes to take over each module. Questions are chosen at random from the list of objectives for that module. Parallel items for some objectives add to the pool of questions available for each module. In addition, each student must demonstrate competence in the use of common audio-visual equipment. The student is given credit for demonstrated achievement as opposed to classroom attendance.

Any student may re-study a module or use a different study technique and then re-test as often as he chooses without penalty. The total pool of questions is used for each random selection at the time of the retest. To date, less than ten percent of the students re-test on any given module (the exact percentage depends upon the particular module). Only about one percent elect to take a third test on a module. Three has been the maximum number of tests taken by any student on any module.

Student Achievement

There appears to have been a marked increase in student achievement in the course since the modular approach was instituted. However, it is impossible to make an objective comparison since the instructional staff, course objectives, evaluation criteria and procedures were changed drastically when the modular approach was instituted in the Summer of 1971. The achievement distribution in the course since the Summer of 1971 is shown below:

Approximately half of the incompletes are later changed to letter grades. When these changes are taken into consideration, the overall distribution is:

Pass	1%
A	76%
B	8%
C	1%
Inc.	6%
W	8%

Summary

The introductory instructional technology course at Purdue University represents a practical application of modular instruction, stated performance objectives, a multi-media approach to learning and mastery evaluation. (Removing the guesswork of "psyching out" the instructor and incorporating ^{the} a student-centered framework with much student choice and selection of material to be learned, allows each student to actively and confidently achieve. The instructional modules are designed from a list of objectives and student projects. Students progress at their own rate toward mastery and are provided with a variety of learning activities and evaluation techniques. Instructional formats include large-group presentations and demonstrations, small-group discussions, guest subject-matter specialists, resource people, games and simulations along with individual study. A key element in the student-centered approach is success orientation -- when students do not achieve, the course has failed! A mastery approach to evaluation is employed. The student selects from a variety of evaluation techniques, such as written quizzes, oral examinations, demonstrations and projects. Of course, he may re-test on any module he has failed to master. As a consequence of using objectives, a variety of learning strategies, self-pacing and diagnostic evaluation; over seventy-five percent of the students demonstrate mastery of ninety percent of the course content.